Motion and Newton's Laws Study Guide Answers

1. If two objects have different masses, which object is easier to accelerate? Which law supports your answer? **The object with the least mass requires less force– 2nd law**

2. The tendency of an object to resist change in its motion is known as **inertia (1st law).**

3. Speed equals distance divided by **time**.

4. On a graph showing distance versus time, a horizontal line represents an object that is **not moving at all (at rest, stopped).**

5. Give an example of negative acceleration**. car approaching a red light, a ball rolling to a stop**

6. If a bicyclist travels 30 kilometers in two hours, her average speed is **S = D/T 15 km/h.**

7. In speed-versus-time graph, a diagonal straight line shows that acceleration is **constantly speeding up.**

8. A person traveling in a car that stops suddenly keeps moving forward due to **inertia**.

9. If the **action** force of a bat striking a ball accelerates the ball in one direction, the **reaction** force accelerates the bat in the **opposite** direction. **(3rd law)**

10. A roller coaster is moving at 10 m/s at the top of a hill and 22 m/s at the bottom of the hill two seconds later. What is the average acceleration? **A=F(s)-I(s)/T (22-10)/2= 6m/s^2**

11. The total distance traveled divided by the total time taken to travel the distance is **average speed**.

12. Newton's first law of motion states that an object remains at rest unless a(n) **unbalanced** force acts on it.

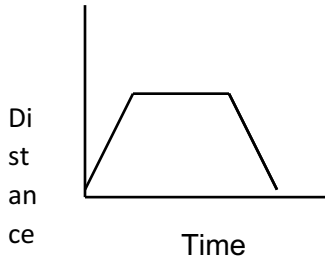
13. The statement "for every action, there is an equal but opposite reaction" is a statement of **Newton's 3rd law.**

14. When a swimmer pushes the water back, the water pushes the swimmer forward. What is the reaction force in this situation? **The water pushing the swimmer forward. (opposite)**

15. If you push a skateboard that has a mass of 60kg with a force of 6N, what force will the skateboard push back on you according to Newton's third law of motion? **6N (It's equal because of 3rd law.)**

16. Forces that are equal in size but opposite in direction and cause no change in motion are **balanced** forces.

17. Draw a distance/time graph that shows the motion of a person who left home, sat on a park bench for a while and then walked home at a constant speed?



18. How far did Kathy jog in the first 4 minutes? **600m**

19. What is Kathy's average speed? Show your work**. 150m/min**

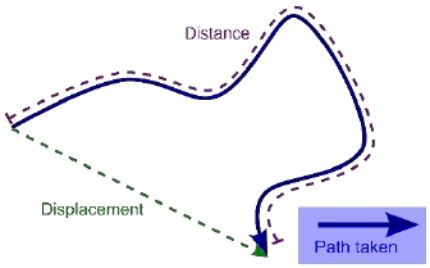
20. How would you describe Kathy's motion? **Constant**

21. Who was traveling at a faster speed from 2-7 minutes? **Kathy, the line is steeper.**

22. Describe Rachel's motion at 9 minutes. **No motion**

23. If Rachel's motion from 2 to 7 seconds had continued, what would have been her distance at 10 seconds? **1000 meters**

24. Define displacement and give an example of when displacement and distance would be equal and when they would be different. **Displacement is the distance and direction an object is from starting point to stopping point.**



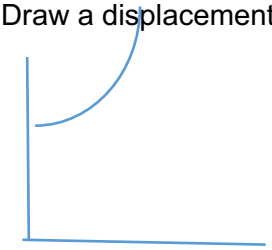
25. What is the key factor in determining if an object is in motion? **Change in position relative to a reference point**

26. What is the motion of an object with zero acceleration? **At rest or at a constant speed (no change in motion)**

27. What is the acceleration formula? **A = (final speed – initial speed) / time**

28. If a family took a vacation and was traveling 60mi/h, how far would they have traveled after 3 hours? **180 miles**

29. Draw a displacement/time graph that represents positive acceleration.



30. Which ball has the fastest acceleration? **Ball A**

31. What happened to the speed of ball B during the final two seconds? **Constant**

32. What does the line segment on the graph from 0 to 3 seconds represent for ball B? **Speeding up**

33. What two things affect the momentum of a moving object? **Mass and velocity (size and speed)**

34. If two bumper cars of equal mass were moving in a straight line when the ride ended, why would one bumper car take longer to come to a stop? **The car that is moving faster would take longer to stop since it has more momentum.**

35. According to Newton's 2nd law of motion, what happens to an object when an unbalanced force is applied to it? **It accelerates in the direction of the force.**

Review inquiry: **Qualitative/quantitative observations, experimental design, control groups/constants**